■ **GRADUATE SCHOOL**
IN SCIENCE, ENGINEERING & ECONOMICS IN PARIS

Why 'MINES ParisTech'

- 'Ecole des **Mines**' founded in 1783
  - At that time 'mining = forefront technology'

- Evolved strongly over the **centuries**
  - With new technologies: coal, electricity, electronics, computing
  - Always involving research in economics and management

- Today, among the top institutions in **applied mathematics**, **applied physics**, **economics and social sciences**

- The historical name 'MINES' remains but we are no longer a '**specialized mining school**'!
- Reporting to the Ministry of Industry and Finance

- Today we are part of "Paris Sciences et Lettres" University.

- Attached by convention to "Institut Mines Telecom" (Ministry in charge of Industry)

ARREST
DU CONSEIL D'ÉTAT
DU ROI
Portant établissement d'une École...
Du 19 Mars 1783.

1783 Foundation decree

Why 'MINES ParisTech'

- Founding member of ParisTech

- ParisTech = **Paris Institute of Science and Technology**
  - Consortium of 10 excellence institutes in science, engineering, economics and business
  - Leaders in their fields

Part of "Paris Sciences et Lettres" Research University

- **25 historical high research universities, centers and schools in the heart of Paris** (ENS, Collège de France, Institut Curie, EHESS, Paris-Dauphine, CNRS, INRIA, INSERM, ESPCI ParisTech, …)

- **10 nobel Prizes, 10 medal fields** (mathematics), 34 CNRS gold medals

- **Rankings:**
  - **QS Ranking: 50th worldwide (1st in France)**
  - **THE Ranking: 41th worldwide (1st in France)**
  - **Potential Shanghai Ranking: 26th worldwide**

- **Common strategy in Msc (Material Sciences & Energy) and PhD**

- **Very few high selected international partner universities**
  - Cambridge University (UK)
  - National Taiwan University
  - New York University (USA)
  - Columbia University (USA)
  - Australian National University
  - …

MINES ParisTech - locations

- **4 locations**
  - **Paris:** Paris downtown (Quartier Latin)
  - **Evry:** 30 km south of Paris
  - **Fontainebleau:** 60 km south-east of Paris
  - **Sophia-Antipolis:** on the "Côte d'Azur", 20 km from the city of Nice

PARIS
EVRY
FONTAINEBLEAU

SOPHIA ANTIPOLIS

Paris

Evry

Fontainebleau

Sophia Antipolis

MINES ParisTech in figures

- **2,000 PEOPLE**
  - 800 employees including **230 faculty members**
  - **1,200 students:**
    - 500 at Master level / Engineering
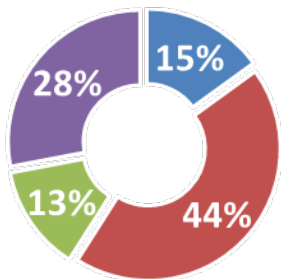   - 300 at Post-Master level (short programmes)
    - 400 at PhD level

2nd
best university in engineering in France
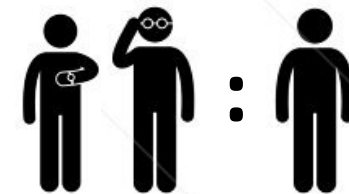
1st
University in France for its links with industry

35%
International students

1/3
International teachers

The library

- **EDUCATION**

15%
28%
13%
44%

- Master in Science and executive engineering
- International Masters
- PhD
- Advanced Masters programs

Student/ prof ratio

Rankings

- From 2018 Mines ParisTech is ranked internationally under the banner of its university PSL

THE WORLD UNIVERSITY RANKINGS (Times Higher Education)

- 2019 Worldwide **41th**
- 2017 Worldwide **251-300TH**
- **2017** Worldwide **99th** Engineering & technology
- **2017** ratio students/ profs **26th worldwide**

QS WORLD UNIVERSITY RANKINGS

- **2019 Worldwide 50th**
- 2017 Worldwide 172th **Engineering and technology**
- 2017 Worldwide 251th **Mechanical Engineering**

L'USINE NOUVELLE

- 2019 **National 2nd**

l'Etudiant

- 2019 **National 1th Academic excellence**
- 2019 **National 1st Links with industry**

Innovation and entrepreneurship

- **Innovation at the heart of our history and strategy**
  - In our relations with industrial partners

  - Companys created by Mines ParisTech Alumni

  - Pre-incubator, Entrepreneurship Price: MINES ParisTech-Criteo

- **Innovation, a transdisciplinary discipline**
  - Department Management, Society, Economy
  - Chair « Theory and Methods of Innovative Conception »
  - Interdisciplinary Institute of Innovation (i3)

- **Participation in public debate**

Research at MINES ParisTech

5 departments

- ✓ Energy and process engineering
- ✓ Earth sciences and environment
- ✓ Mathematics and complex systems
- ✓ **Materials** and mechanics
- ✓ Economy, management and society

18 research labs

- Energies of the future
- Transport and mobility
- New materials
- Health and environment
- Innovation and competitivity

1000 /year Research contracts 30 K
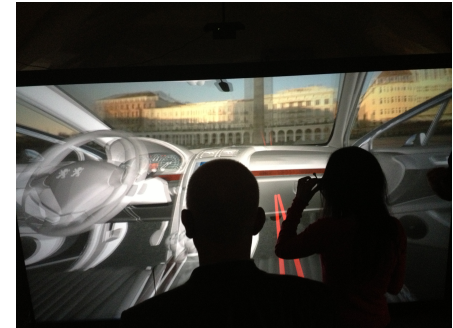
200 industrial partners

27 industrial chairs

4OO scientific publications rank A

2 Nobel prizes

Maurice ALLAIS - Economics - 1988
Georges CHARPAK – Physics - 1992

1st

University in France for the amount of contractual research

# Applied mathematics and systems

○ Research at MINES ParisTech

143 faculty members

Research centers and groups

Centre of robotics (CAOR)
Centre for bio-informatics (CBIO)
Centre Automatic Control and Systems (CAS)
Centre of Applied Mathematics (CMA)
Centre of Mathemacial Morphology (CMM)
Centre of Computer Sciences (CRI)

Main research topics

- Image processing and mathematical morphology
- Mobile Robotics and Software Environments
- Point Cloud and 3D Modeling
- Virtual Reality and Augmented Reality
- Machine learning in production and logistics
- Control and optimization
- Information technology and programming languages
- Automatization and Systems
- Bio-informatics and data analyses: computational biology, statistics, precision medicine, bioimaging, computer vision, chemoinformatics, genetics, systems biology, big data
- Modeling methods to help decision-making

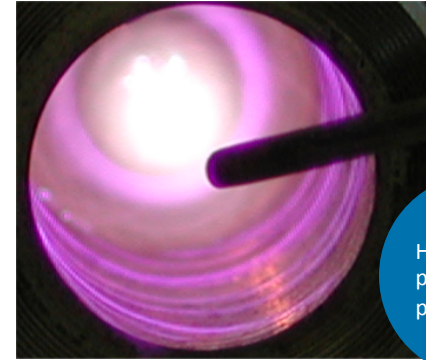# Energy and process engineering
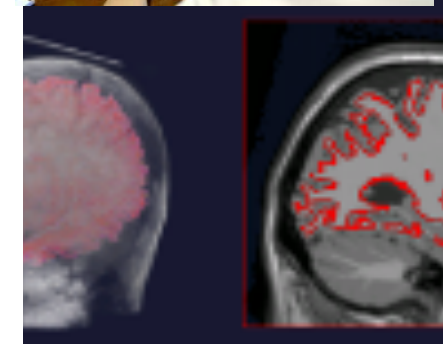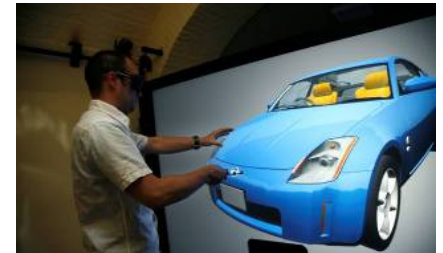
○ Research at MINES ParisTech

155 faculty members

Research centers and groups
Centre for Energy Efficiency of Systems (CES)
Centre Thermodynamics of Processes (CTP)
Centre Observation, Impacts, Energy (O.I.E.)
Centre for Processes, Renewable Energies and
Energy Systems (PERSEE)

Hydrogen production by plasma

Air conditioning

Main research topics

- Energy efficiency of Systems
- Thermodynamic of Processes
- Observation, Impacts, Energy
- Processes, renewable energies and energy systems

Artificial sun

Mechanics and Materials
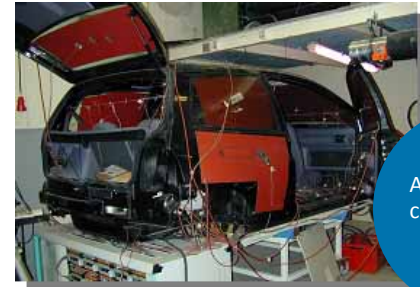
○ Research at MINES ParisTech

276 faculty members

Research centers and groups

Centre of Material Transformation (CEMEF)

Centre of Material Engineering (MAT)

Main research topics:

- Increase lifetime
  - Damage, ageing and fracture mechanisms
- Improve materials properties
  - Microstructure optimisation
  - Microstructure control during parts forming
- Reduce environmental impacts
  - Lighter structures design
  - Bio-sourced materials development
- Develop new materials and processes
- Materials simulations

Earth Sciences and Environnement
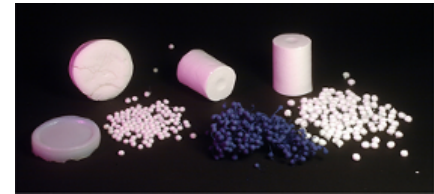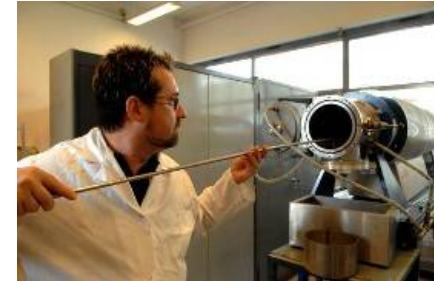
○ Research at MINES ParisTech

117 faculty members

Research centers and groups
Centre for Geosciences (GEOSCIENCES)
Higher Institute for Environmental
Engineering
and Management (ISIGE)

Main research topics:

- **Geosciences:**
  - Geology
  - Geophysics
  - Geostatistics
  - Civil and mining Eng.
- **Environment engineering and management**

Gas storage

Economics, management and society
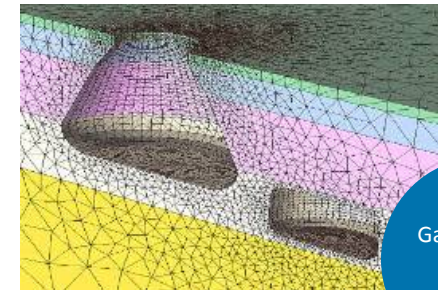
130 faculty members

Research centers and groups
Centre for Industrial Economics ([CERNA](#))
Centre for Management Science ([CGS](#))
Research Center on Risks and Crisis ([CRC](#))
Centre for the Sociology of Innovation ([CSI](#))

Main research topics

- **Industrial Economics**
- **Scientific management**
- **Sociology of innovation**
- **Hazards and Risks sciences**

Educational programs offered

The Universities / 'Grandes Ecoles' system

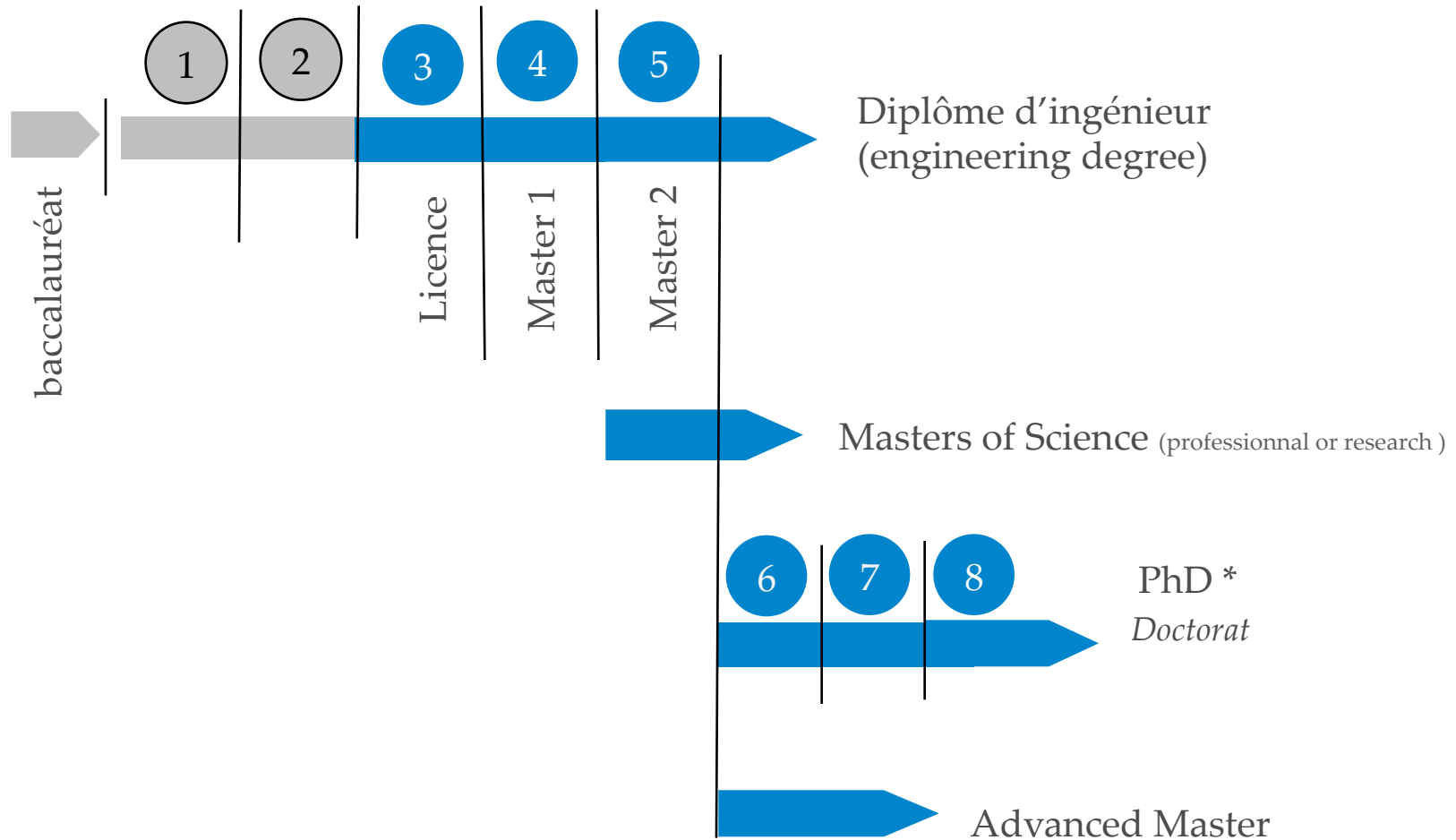|	UNIVERSITY	GRANDES ECOLES	*Comparaison with other standars*	
			BOLOGNA	INTERNATIONAL
Year 8	Doctoral studies	Doctoral studies	Doctorate	Phd
Year 7				
Year 6				
Year 5	Master	Engineering Degree	Master 2	Master degree
Year 4			Master 1	
Year 3	Bachelor		Licence	Bachelor degree
Year 2		*'Preparatory classes'*		
Year 1				
	'Bac' = end of secondary studies exam			

- More than 250 science and engineering "Grandes Ecoles" !
- 4 most selective ones:
  - Ecole Normale Supérieure
  - Ecole Polytechnique
  - **MINES ParisTech**
  - Ecole Centrale Paris

- Admission through 'Preparatory classes': 2 years of **very intensive undergraduate** studies carried out in honours classes, ended with **national competitive** exams

Mines ParisTech educational programs

○ Diplôme d'ingénieur – MSc in sciences and executve engineering

9 to 21 months in internship

800 lecturers from corporate world

Top 1%
of scientific students in France admitted

60%
of the students employed even before being available

49 k
Average salary (first position)

The **philosophy**:

▪ To **train engineers** with an strong scientific background, **prepared to become managers**, in any kind of companies, **all over the world**.

The **program:**

▪Strong background in fundamental courses,
  ✓ Mathematics, physics, mechanics …
▪with a multidisciplinary approach:
  ✓ Social sciences, Languages, Sports, Economy and management, Innovation and entrepreneurship
▪and the possibility to customize your curriculum with 18 fields of specialization:
  ✓ Applied mathematics, Information technology, Control engineering and computer science, Computational Biology, Earth and environmental sciences, Materials sciences and engineering, Energy and chemical engineering, Economics and social sciences

Mines ParisTech educational programs

○ Programs taught in English

- **Masters (PSL)**
  - Materials science and Engineering
  - Master in Energy

- **Advanced Masters (and continuing education)**
  - Materials, Processing and Modeling (MAPMOD)
  - International Environmental Management (ENVIM) together with Tsinghua University
  - International Energy Management (ALEF) together with Tsinghua University
  - *CESECO : Analyse technique et économique des opérations minières à ciel ouvert*
    - Technical and economical analysis of open-pit mining operations

- **PSL-ITI:** *Institut de Technologie et d'Innovation*
  - Preparation to PhD: 'year 0': courses, research, start-up business plan… in multidisciplinary fields

- **Research internship** at Bsc 4 or MSc1 or MSc 2 level in one of above mentioned research centers

- **PhD** in one of above mentioned research centers

International relations

120
partner universities

33
Double degree agreements

20%
Of research contracts with a foreign partner

35% of international students

20 % Of outgoing students for exchange

100% of ours students in internship abroad

Relations with the Republic of Korea :

- ✓ Agreement with SNU in 2007
- ✓ Agreement with KAIST in 2009
- ✓ Agreement with POSTECH in 2015
- ✓ 5 student from ROK (two exchanges, 3 for double Master)